WASHINGTON DEPARTMENT OF ECOLOGY

ENVIRONMENTAL ASSESSMENT PROGRAM

FRESHWATER MONITORING UNIT

STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 25E060

STATION NAME: Abernathy Creek

WATER YEAR: 2011

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Introduction

Watershed Description

Abernathy Creek is a right bank tributary to the Columbia River located approximately 9 miles west of Longview, Washington. Historically the stream supported runs of coho and chinook salmon and steelhead and cutthroat trout. Land use is primarily commercial forestry with state and private holdings. Flow basalt with interbedded sandstone defines the underlying geology. Precipitation varies with elevation but typically ranges between 60 and 70 inches annually. Hydrology is almost entirely rainfall driven.

Gage Location

The gage is on the right bank near the downstream side of the Slide Creek road bridge.

Table 1.

Drainage Area (square miles)	20.3
Latitude (degrees, minutes, seconds)	46 12 20.7 north
Longitude (degrees, minutes, seconds)	123 09 14.0 west

Discharge

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	112
Median Annual Discharge (cfs)	98
Maximum Daily Mean Discharge (cfs)	568
Minimum Daily Mean Discharge (cfs)	8.1
Maximum Instantaneous Discharge (cfs)	748
Minimum Instantaneous Discharge (cfs)	7.7
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	244
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	11
Number of Days Discharge is Greater Than Range of Ratings	7
Number of Days Discharge is Less Than Range of Ratings	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Narrative

A relatively small storm event in early October 2010 elevated discharge above baseflow. A series of moderate storms followed this early autumn event. Peak discharge for WY2011 was recorded on January 16, 2011 during a large event. Discharge declined rapidly following this event until early February 2011. Another series of small to moderate storms persisted until mid-May 2011. Discharge then declined slowly to baseflow conditions. The lowest discharge of the water year was recorded in mid-September. Two small storms in late September 2011 elevated discharge above baseflow. The discharge record during baseflow conditions, primarily late July, August, and early September were affected by a distinct diurnal oscillation. The diel fluctuation may be due to evapotranspiration within the forested basin. Seven days were not included in the Table 2 statistics, because some of the scans recorded on those days exceeded the stage value associated with twice the highest measured discharge for the effective rating table. The absence of these 7 days lowered the values in Table 2.

Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	1.8
Weighted Rating Error (% of discharge)	10.9
Total Potential Error (% of discharge)	12.7

Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	601	8	
Period of Ratings	10/01-01/05	01/05-09/30	
Range of Ratings (cfs)	4.8-490	4.2-766	
No. of Defining Measurements	9	19	
Rating Error (%)	1.9	9.0	

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

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Period of Ratings			
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Rating Error (%)			

Narrative

Two rating tables were created to predict discharge for WY2011. Rating Table 601, a replica of Rating 6, covered the period from 10/01/2010 to 01/05/2011. The shift from Rating 601 to Rating 8 occurred just prior to the largest storm event of the water year. The timing of the shift is somewhat unusual. The shift occurred when the control scoured slightly. Over time, Rating 8 has proven to be a very stable and robust rating for predicting discharge at the Abernathy Creek station.

Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	4.40
Maximum Recorded Stage (feet)	9.21
Range of Recorded Stage (feet)	4.81
Number of Un-Reported Days	7
Number of Days Qualified as Estimates	0
Number of Days Qualified as Unreliable Estimates	0

Narrative

The Abernathy Creek stage record for WY2011 was complete except for two (approximately) one-day gaps. The gaps were filled with regressed, very well-correlated stage data from the nearby station on Germany Creek. Any discrepancies between the primary gage index observations and the stage values recorded on the datalogger were resolved using the data shift function.

Modeled Discharge

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	none
Range of Modeled Stage (feet)	
Range of Modeled Discharge (cfs)	
Valid Period for Model	
Model Confidence	

Surveys

Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date

Activities Completed

Continuous monitoring and TTS sampling continued in WY2011--stage, water temp, air temp, dissolved O2, conductivity, turbidity.